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The mesoscopic chaotic cavity as a rectifying heat engine ANDREW JORDAN, University of Rochester, BJÖRN SOTHMANN, University of Geneva, RAFAEL SÁNCHEZ, Instituto de Ciencia de Materiales de Madrid, MARKUS BUTTIKER, University of Geneva — We present an exactly solvable model of a mesoscopic heat engine that works using the principle of rectifying thermal fluctuations applied to a nonlinear system. The system is a chaotic mesoscopic cavity where the contact transmission to leads is energy-dependent. This energy-dependence is generic in mesoscopic conductors, and leads to an intrinsic nonlinearity. The cavity is coupled capacitively to another conductor, held at a different temperature. The nonlinear cavity rectifies the thermal fluctuations, leading to a hot spot rectified electrical current that is proportional to the asymmetry in the energy-dependence of the contacts, and to the temperature difference. We will discuss the maximum power produced by the system, as well as the efficiency of the engine by comparing it to the heat current that passes between the coupled systems. Possible practical energy-harvesting applications will be proposed.

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